



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/901,580

07/11/2001

Gonzalo Wills

2500.370

4799

7590

11/03/2004

Hall, Priddy, Myers & Vande Sande
Suite 200
10220 River Road
Potomac, MD 20854

EXAMINER

CURTIS, CRAIG

ART UNIT

PAPER NUMBER

2872

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/901,580

Applicant(s)

WILLS ET AL.

Examiner

Craig Curtis

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 5 November 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2 May 2002</u> . | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 2872

DETAILED ACTION

Disposition of the Instant Application

- This Office Action is responsive to Applicants' Amendment filed on 5 November 2002, which has been made of record in the file as Paper No. 8.
- By this amendment, Applicants have amended claims 1 and 24.
- Claims 1-27 are presently pending in the instant application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. **Claims 1-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xie et al. (6,212,008 B1) in view of Fukushima (6,507,422 B1).**

Xie et al. disclose the invention as claimed--an isolated polarizing optical beam splitter/combiner for combining orthogonally polarized beams of light into a single port in a combining direction, or for splitting a beam of light into orthogonally polarized beams of light to spatially separated ports in a splitting direction comprising:

a single port (Fig. 12, 606) for launching a beam of light into the splitter/combiner, or for outputting a combined beam of light from the splitter/combiner;

Art Unit: 2872

a pair of spaced apart ports (id., 602, 604) for launching orthogonally polarized beams of light into the splitter/combiner, or for outputting orthogonally polarized beams of light from the splitter/combiner;

a first polarization beam splitter (622) optically coupled to the single port, oriented to provide difference optical paths for two orthogonally polarized beams of light;

a second polarization dependent beam steering means (640A, 640B) optically coupled to the pair of spaced apart ports, oriented to provide different optical paths for two orthogonally polarized beams of light;

a non-reciprocal rotator (626) between the first polarization beam splitter element and at least an element of the second polarization dependent beam steering means for rotating a polarization of each of two orthogonal beams of light and maintaining the orthogonal relationship between them (see Fig. 12), said non-reciprocal rotator adapted to be driven for transmission in a selected combining direction or a splitting direction, wherein when driven in the combining direction, the non-reciprocal rotator permits light to propagate from the pair of ports to the single port, and prevents light from coupling between the single port and the pair of ports, or

wherein when driven in the splitting direction, the non-reciprocal rotator permits light to propagate from the single port to the pair of ports, and prevents light from coupling between the pair of ports and the single port (see Fig. 12), further including teachings of the following:

wherein the first polarization beam splitter element and the second polarization dependent beam steering means comprise a first and a second birefringent elements (as above);

Art Unit: 2872

wherein the first and second birefringent elements are located in object space or image space (see Fig. 12);

wherein the non-reciprocal rotator comprises a Faraday rotator (626: col. 5, ll. 60);

wherein the non-reciprocal rotator provides a rotation of zero degrees in a selected direction and provides a rotation of 90 degrees in a reverse direction (implicit);

wherein the first birefringent element and the second birefringent element have rotational axes oriented substantially parallel or antiparallel to each other (implicit);

wherein at least one of the first birefringent element and the second birefringent element has an axis oriented for maximum walk-off between the different optical paths (see Fig. 12);

wherein the first birefringent element and the second birefringent element have rotational axes oriented at substantially 45 degrees to each other and the Faraday rotator provides a rotation of 45 degrees (see Fig. 12: second non-reciprocal rotator 646);

wherein the first birefringent element and the second birefringent element have rotational axes which together with a rotation of the non-reciprocal rotator provide efficient coupling in a transmission direction between the different optical paths of the first birefringent element and the different optical paths of the second birefringent element while substantially preventing coupling in an isolation direction (see Fig. 12);

wherein the first birefringent element has an o-ray path and an e-ray path and the second birefringent element has an e-ray path and an o-ray path such that the e-ray path of the second birefringent element is optically coupled with the o-ray path of the first birefringent element and the o-ray path of the second birefringent element is optically coupled with the e-ray path of the first

Art Unit: 2872

birefringent element, wherein the different optical paths for two orthogonally polarized beams of light passing through both the first and second birefringent elements have a substantially same optical path length (see Fig. 12);

wherein the first and the second birefringent elements are substantially of a same optical length (see Fig. 12);

further comprising a third birefringent element and a second non-reciprocal rotator between the second birefringent element and the third birefringent element (see Fig. 12);

wherein a pair of output/input sub-ports at the different optical paths of the first birefringent element have a separation "d1" and wherein the second and the third spaced apart ports of the second birefringent element have a separation "d2" which is greater than or equal to "d1" (see Fig. 12);

wherein "d1" is substantially equal to "d2/2" (see Fig. 12)— **EXCEPT FOR** an explicit teaching wherein said non-reciprocal rotator adapted to be driven for transmission in a selected combining direction or a splitting direction permits light to propagate from said pair of ports *simultaneously* to said single port, and prevents light from coupling between said single port and said pair of ports, or wherein when driven in said splitting direction, said non-reciprocal rotator permits light to propagate from said single port *simultaneously* to said pair of ports, and prevents light from coupling between said pair of ports and said single port. (Emphasis added.)

Fukushima, however, discloses a teaching of driving non-reciprocal rotators (FR: see col. 10, ll. 58-67—col. 11, ll. 1-64). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the invention of **Xie et al.** such that said non-reciprocal rotator, when driven for transmission in a selected combining direction and, alternately, when driven

Art Unit: 2872

in a splitting direction, **Fukushima** providing a teaching of driving (biasing) a non-reciprocal rotator to achieve a desired discrimination between beams in an optical device, for at least the purpose of achieving a desired discrimination between said orthogonally polarized beams of light transiting said isolated polarizing optical beam splitter/combiner.

Response to Arguments

2. Applicants' arguments filed 5 November 2002 with respect to the claims have been fully considered but are moot in view of the new ground(s) of rejection presented hereinbefore.

Art Unit: 2872

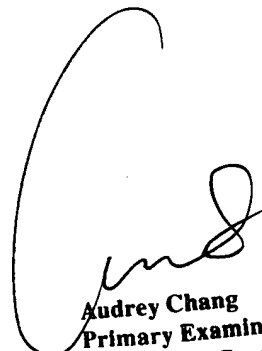
Contact Information

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig Curtis, whose telephone number is (571) 272-2311. The examiner can normally be reached on Monday-Friday, 9:00 A.M. to 6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew A. Dunn, can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.H.C.
Craig H. Curtis
Group Art Unit 2872
28 October 2004


Audrey Chang
Primary Examiner
Technology Center 2800